September 16, 1999

MEMORANDUM

TO: Orville D. Green, Administrator
State Air Quality Program

FROM: Susan J. Richards, Program Manager
Air Quality Permit Program

SUBJECT: Issuance of Tier II Operating Permit (#027-00054) to WestFarm Foods (formerly Darigold, Inc.); Caldwell, Idaho

PROJECT DESCRIPTION

This project is for the issuance of a Tier II Operating Permit (OP) for WestFarm Foods, (WestFarm) located in Caldwell, Idaho. The emissions sources at the facility include: two Kewanee Model F 25.1 MMBtu/hr natural gas fired boilers, a box dryer (the "L"-dryer), and two tall-form dryers (the "Niro" and "Anhydro" dryers).

DISCUSSION

On November 25, 1998, the Division of Environmental Quality (DEQ) received an application for a Tier II OP from WestFarm (formerly Darigold). On December 18, 1998, the application was declared complete. The proposed permit went to public comment on July 30, 1999. Comments were received from WestFarm on August 30, 1999.

FEES

Fees apply to this facility in accordance with IDAPA 16.01.01.470 (*Rules for the Control of Air Pollution in Idaho*). The facility is subject to permit application fees for this Tier II OP of $500. The facility has paid these fees.

RECOMMENDATIONS

Based on the review of the application materials, and all applicable state and federal regulations, staff recommends that DEQ issue a Tier II OP to WestFarm Foods. An opportunity for public comment on the air quality aspects of the proposed OP was provided in accordance with IDAPA 16.01.01.404.01.c. Staff members have notified the facility in writing of the required Tier II application fee of five hundred dollars ($500.00). The facility has paid this fee.

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cc: R. Wilkosz
P. Rayne
S. West, Boise Regional Office
Source File (#027-00054)
COF

September 16, 1999

MEMORANDUM

TO: Susan J. Richards
Program Manager
Air Quality Permit Program

FROM: Thomas R. Lundahl, Air Quality Engineer
State Technical Services

THROUGH: Daniel P. Salgado
Lead Process Engineering
State Technical Services Office

SUBJECT: Technical Analysis for Tier II Operating Permit (#027-00054)
WestFarm Foods (Caldwell)

PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 16.01.01 Section 400 (*Rules for the Control of Air Pollution in Idaho*) for issuance of Tier II Operating Permits.

PROJECT DESCRIPTION

This project is for the issuance of a Tier II Operating Permit (OP) for WestFarm Foods, (WestFarm) located in Caldwell, Idaho. The emissions sources at the facility include: two Kewanee Model F 25.1 MMBtu/hr natural gas fired boilers, a box dryer (the "L"-dryer), and two, tall-form dryers (the "Niro" and "Anhydro" dryers).

FACILITY DESCRIPTION

WestFarm produces and markets dairy products. Trucks transport whole milk from dairy farms direct to the WestFarm plant. The whole milk is pumped through pipes under Albany street to vertical storage tanks adjacent to the plant. WestFarm makes cheese from the whole milk and milk powder from the liquid whey drawn off during the cheese manufacturing process. The liquid whey passes through a clarifier to capture whey fines, and then it is pumped to a holding tank. From the tank, the whey is heated and pumped to a separator where most of the fat is separated from the whey. After separation, the skim whey is sent to an evaporator where it is condensed to roughly 60% solids (the evaporator pulls water out of the skim whey and pasteurizes the whey). Condensed whey is pumped to crystallization tanks where it solidifies further.

The whey fat is sold, and the crystallized whey is pumped to the main dryer chamber through the atomizer. The atomizer sprays the condensed whey in a fine mist into the chamber. Heated air is blown into the main chamber to dry the condensed whey. The powder falls to the fluidized bed, which conveys it to the powder storage tanks. Fine powder dust is carried by the heated air to a cyclone, which sends most of the powder back to the fluid bed. The powder dust that escapes out the cyclone passes through a baghouse before exiting from the dryer stack. Again, baghouse fines are returned to the product bin.

The bagging operation consists of four powder storage bins (one for skim milk powder and three for whey powder), two weigh hoppers, and two bagging stations (one for skim and one for whey). The powder is sent from the dryers to storage and then to the bagging station. The bagging occurs in a room inside the main production building.

Although there are bin vents on the powder storage tank, WestFarm ducted the vents from the bin vents to the new "F-dryer" baghouse used to capture product dried in the Niro dryer. Thus, any residual dust generated by the powder storage tanks or the bagging station is emitted through the Niro dryer baghouse stack, and there are no emission points from the powder storage tanks.

Two 25.1 MMBtu/hr natural gas fired boilers are available to generate steam for the evaporators, where the heat is indirectly transferred to the skim whey to drive out water.

This project is for an OP for the following existing point sources.

Point Sources:

(1) Niro Dryer Stack: Emissions from this stack are controlled by the "F-dryer" baghouse.

The stack data are the following:

UTM-X Coordinate (KM)	525.194
UTM-Y Coordinate (KM)	4834.956
Stack Exit Height (ft)	55.0
Stack Exit Diameter (ft)	2.2
Stack Exit Flow Rate (ACFM)	24,349
Stack Exit Temperature (°F)	165

(2) Anhydro Dryer Stack: Emissions from this stack are controlled by the Anhydro baghouse.

The stack data are the following:

UTM-X Coordinate (KM)	525.197
UTM-Y Coordinate (KM)	4834.933
Stack Exit Height (ft)	80.0
Stack Exit Diameter (ft)	3.3
Stack Exit Flow Rate (ACFM)	23,587
Stack Exit Temperature (°F)	148

(3) L Dryer Stack: Emissions from this stack are controlled by the C.E. Rogers baghouse.

The stack data are the following:

UTM-X Coordinate (KM)	525.185
UTM-Y Coordinate (KM)	4834.947
Stack Exit Height (ft)	50.0
Stack Exit Diameter (ft)	3.1
Stack Exit Flow Rate (ACFM)	36,953
Stack Exit Temperature (°F)	167

(4) Kewanee Model F Boiler #1 Stack: Emissions from this stack are uncontrolled.

The stack data are the following:

UTM-X Coordinate (KM)	525.168
UTM-Y Coordinate (KM)	4834.956
Stack Exit Height (ft)	50.0
Stack Exit Diameter (ft)	2.5
Stack Exit Flow Rate (ACFM)	4,030
Stack Exit Temperature (°F)	200

(5) Kewanee Model F Boiler #2 Stack: Emissions from this stack are uncontrolled.

The stack data are the following:

UTM-X Coordinate (KM)	525.172
UTM-Y Coordinate (KM)	4834.953
Stack Exit Height (ft)	62.0
Stack Exit Diameter (ft)	2.5
Stack Exit Flow Rate (ACFM)	4,030
Stack Exit Temperature (°F)	200

A more detailed process description can be found in the Tier II OP application materials and in the facility's source file.

SUMMARY OF EVENTS

On November 25, 1998, DEQ received an application for a Tier II OP from WestFarm (formerly Darigold). On December 18, 1998, the application was declared complete. A public comment period was held from July 30, 1999 to September 30, 1999. Comments were received from WestFarm on August 30, 1999.

DISCUSSION

1. Emission Estimates

Emission estimates were provided by WestFarm (formerly Darigold). DEQ also estimated the emissions from all the sources at the facility (see Appendix A). PM and PM_{10} emission rates for all three dryers were based on an October, 1998 performance test performed by Valid Results, Inc. It was conservatively assumed that 40% of the PM is PM-10. All other emissions from equipment/processes were estimated using emissions factors furnished by AP-42, 5th edition. The annual emissions calculations were based on 8,760 hours per year operation, except for the L Dryer, which was based on 4,380 hours.

2. Modeling

Modeling analysis performed showed that the Caldwell plant, operating with the emission limits in the Tier II operating permit, does not violate any of the National Ambient Air Quality Standards. For a complete discussion of the modeling, see Appendix B in the Tier II Operating Permit Application.

3. Area Classification

WestFarm, in Canyon County, Idaho, is located in AQCR 64. The area is classified as nonattainment for PM_{10} and CO and attainment or unclassifiable for all other federal and state criteria air pollutants (i.e., NO_x, VOCs, and SO_x).

4. Facility Classification

The facility is not a designated facility as defined in IDAPA 16.01.01.006.25. The facility is classified as an A2 source because the actual emissions of any criteria pollutant is less than 100 tons per year.

5. Regulatory Review

This OP is subject to the following permitting requirements:

a.	IDAPA 16.01.01.401	Tier II Operating Permit
b.	IDAPA 16.01.01.403	Permit Requirements for Tier II Sources
c.	IDAPA 16.01.01.404.01(c)	Opportunity for Public Comment
d.	IDAPA 16.01.01.404.04	Authority to Revise or Renew Operating Permits
e.	IDAPA 16.01.01.406	Obligation to Comply
f.	IDAPA 16.01.01.470	Permit Application Fees for Tier II Permits
g.	IDAPA 16.01.01.625	Visible Emission Limitation
h.	IDAPA 16.01.01.650	General Rules for the Control of Fugitive Dust

6. Process Weight Rate

Process weight rate, as it applies to the driers, is the weight in pounds per hour of whey fed to the driers. With its baghouses in place, WestFarm meets all process weight rate limits with the limits imposed in Appendix A of the permit.

7. Testing Regulation

In order to maintain operational flexibility, WestFarm has been allowed to operate at 50% over the throughput achieved during the 1998 performance test. WestFarm's emission rate shall still remain below their allowable limits. Within 6 months of reaching a throughput of 40% over the source test throughput, WestFarm must retest at the highest throughput achieved and show compliance with their emission limits.

8. Kewanee Natural Gas Fired Boilers

Because the amount of fuel which can be burned in these boilers is inherently limited by the burner design, and because they burn only natural gas and have been permitted for 8,760 hours per year, limiting their burner capacity to 25.1 MMBtu/hr has been deemed a sufficient requirement for these boilers.

FEES

Fees apply to this facility in accordance with IDAPA 16.01.01.470. The facility is subject to permit application fees for this Tier II OP of $500. The facility has paid these fees.

AIRS

The AIRS facility subsystem has been updated as a result of this permitting action. The AIRS forms can be found in Appendix C.

RECOMMENDATIONS

Based on the review of the application materials, and all applicable state and federal regulations, staff recommends that DEQ issue a Tier II OP to WestFarm Foods. An opportunity for public comment on the air quality aspects of the proposed OP was provided in accordance with IDAPA 16.01.01.404.01.c. The facility has paid the required Tier II application fee of five hundred dollars ($500.00).

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Attachments

cc: P. Rayne
R. Wilkosz
S. West, Boise Regional Office
Source File (#027-00054)
COF

APPENDIX A

(Emission Estimates)

Company: WestFarm Foods
Location: Caldwell

	Fuel Type	Capacity MM Btu/h	Emission Factor [lb/10_6 ft_3] (1) PM / PM10	SOx	NOx	CO	VOC
Natural Gas Combustion Emission Factors	Nat. Gas	10 - 100	6.20	0.60	140.00	35.00	5.80
		0.3 - 10	4.50	0.60	100.00	21.00	8.00
Average Heating Value of Nat. Gas	1020.00 Btu/scf						

Source	Fuel Type	Max. Fuel Emission [tons/year] 10_6 ft_3/yr	PM / PM10	SOx	NOx	CO	VOC	Total tons/yr
#1 Kewanee Model F Boiler (25.1MMBtu/hr)	Nat. Gas	215.56	0.67	0.06	15.09	3.77	0.63	20.22
#2 Kewanee Model F Boiler (25.1MMBtu/hr)	Nat. Gas	215.56	0.67	0.06	15.09	3.77	0.63	20.22
Niro Dryer (4.18 MMBtu/hr)	Nat. Gas	35.90	0.08	0.01	1.79	0.38	0.14	2.41
Anhydro Dryer (7.8 MMBtu/hr)	Nat. Gas	66.99	0.15	0.02	3.35	0.70	0.27	4.49
L Dryer (2 MMBtu/hr)	Nat. Gas	8.59	0.02	0.00	0.43	0.09	0.03	0.58
Niro Dryer (source test for lost product)			0.48					
Anhydro Dryer (source test for lost product)			0.46					
L Dryer (source test for lost product)			2.36					
TOTAL			4.89	0.16	35.75	8.72	1.70	47.91

(1): Tables 1.4-1,2,&3 AP-42 5th Edition

APPENDIX B

(Modeling Results)

February 12, 1999

MEMORANDUM

TO: Robert Wilkosz, Chief, Technical Services Bureau (TSB), Air and Hazardous Waste (A&HW)

FROM: Mary Walsh, Air Quality Meteorologist, TSB, A&HW

THRU: Matt Stoll, Air Quality Sciences Manager, TSB, A&HW

SUBJECT: Modeling Review for Darigold, Inc., in Caldwell, Idaho (Canyon County)

1. SUMMARY

The Idaho Division of Environmental Quality (IDEQ) has received a Tier II Operating Permit (OP) application from the Darigold, Inc., plant in Caldwell, Idaho. As part of this permitting application, the facility has requested that IDEQ establish federally enforceable limitations on the plant's PM_{10} potential to emit (PTE). This has been proposed so that the facility may be exempt from needing to obtain a Tier I operating permit. Modeling these proposed limitations, along with the potentially significant affects of building downwash, it has been found that the facility will meet all applicable air quality standards.

2. DISCUSSION

2.1 Project Description

The facility in question is located at 520 Albany Street in Caldwell, Idaho. This area is classified as attainment for PM_{10} and as unclassifiable for all other criteria pollutants. At present the plant's emissions fall below the criteria established for defining a major source, making it subject to all rules and regulations governing the operation of a minor source in the state of Idaho.

Darigold processes cheese and milk powder from whole milk that is obtained from local dairy farms. The milk powder, itself, is actually a by-product of the cheese manufacturing process when liquid whey is removed and passed through a clarifier to capture any whey fines. This material is then pumped into a holding tank where it is heated and then pumped into a separator where most of the fat is removed. The skim whey that is leftover, is then sent to an evaporator where it is condensed into 60% solids. This condensed whey is pumped into a crystallization tank to further solidify. The whey fat is sold to other companies while the crystallized whey is sprayed by an atomizer into a main drying chamber. Heated air is pumped into the chamber to dry the condensed whey. The resulting powder falls to a fluidized bed which then conveys it to a storage tank. Any fine powder caught by the facility's cyclones and baghouses is returned to the fluid bed. The powder is sent from the dryers to storage and then to the bagging section which consists of four powder storage bins, two weigh hoppers, and two bagging stations. Although there are vents located on the powder storage tank, Darigold recently decided to duct the emissions from these vents into what is known as the F-dryer. This box dryer was converted over to a baghouse in order to further control emissions from the facility's Niro dryer. Thus any dust generated by the powder storage tanks or the bagging station will be emitted through this new baghouse.

There are five emission points associated with operations at the Caldwell plant. These consist of two natural gas fired boilers and three dryers. The two boilers generate steam for the facility's evaporators so that any excess water may be removed from the skim whey. The various dryers are used to further dry and help solidify the resulting milk powders. Although emission estimates have shown that the plant's total emissions for most of the criteria pollutants of concern are below the threshold of 100 tons per year, thereby exempting them from the need to obtain a Tier I OP for these pollutants, there is the potential to

2.2 Applicable Air Quality Impact Limits

The area, in Canyon County, is considered attainment for PM_{10} and unclassified for all other criteria air pollutants. The applicable air quality standards which must be met by the facility are the National Ambient Air Quality Standards (NAAQS). For PM_{10} the appropriate values are 150 μg/m3 on a 24-hour basis and 50 μg/m3 on an annual basis. For NO_x the applicable standard is 100 μg/m3 for an annual averaging period. For CO the applicable NAAQS are 40,000 μg/m3 for a 1-hour averaging period and 10,000 μg/m3 for the 8-hour average.

2.3 Background Concentrations

Based upon data from IDEQ's monitoring network in Nampa, Idaho, the applicable background numbers for analyzing PM_{10} impacts in Canyon County are 38.3 μg/m3 on an annual basis and 81.0 μg/m3 on a 24-hour basis. Due to a lack of ambient monitoring data from Canyon County for the other pollutants analyzed, background information was taken from measurements taken in Boise, Idaho during 1997.

2.4 Co-contributing Sources

Co-contributing sources were not explicitly evaluated in this analysis. It was assumed that potential contributions from outside sources were included in the background concentrations used.

2.5 Modeling Impact Assessment

Using a recent version of the EPA approved Industrial Source Complex or ISCST3 model (dated 98226) and five years worth of data from the National Weather Service (NWS) in Boise, Idaho, the impact of operations at the Darigold facility in Caldwell, Idaho were analyzed. The pollutants of concern were PM_{10}, NO_x and CO. The amount of SO_2 emitted by the facility was determined to be insignificant and was therefore not included in this evaluation. Emission rates for each of these pollutants were calculated using stack testing results and included a margin of safety to ensure compliance with the applicable air quality standards based upon the emission limitations being requested by the applicant.

Building downwash can play a very important role in determining ambient impacts close to a source. This is especially true when analyzing roof-top emission sources located in a multi tiered building complex. In light of the fact that this facility has some relatively short stacks that may be significantly influenced by building downwash, the facility originally proposed that a new modeling tool known as ISC-PRIME be allowed for analyzing these effects. Although it is believed that this new modeling technique may contain more accurate building downwash algorithms, it was determined, after discussion with EPA, that there had not, as of yet, been enough proof given to substantiate this belief. The facility was, however, given the option to carry out an additional analysis to show that this new modeling approach would provide equal if not better results than the presently approved modeling technique. The facility opted for using the approved modeling techniques and so, as a result, building downwash parameters were determined using the EPA approved BPIP model and were included in this modeling analysis for the most realistic determination of the facility's ambient impacts.

In addition to looking at the ambient concentrations within a close proximity to the source, the facility's consultants also evaluated Darigold's impact upon the complex terrain features located to the northeast of the plant. Using a characterization of the land use and population estimates within a 3 km radius of the facility, it was determined that the rural dispersion option would be used in the modeling analysis. A nested receptor grid was used in the evaluation. The inner portion of this network was 2 km by 2 km and utilized a grid spacing 100 m. The outer grid encompassed an area that was 5 km by 6 km and had a resolution of 200 m. It is usually recommended by IDEQ that a course grid be used in determining the maximum impact areas. Once these locations have been identified then a grid spacing of 25 to 100 m is recommended for a more refined impact analysis. In addition to the aforementioned grids, a ring of

Appendix B Dispersion Modeling Analysis
Darigold, Inc, Caldwell, Idaho

Introduction

In this Appendix, McCulley, Frick & Gilman, Inc. (MFG) describes the results of a dispersion modeling analysis conducted on behalf of Darigold, Inc. for the Caldwell Plant. The location of Darigold's Caldwell facility is shown in Figure 1. Our modeling supports Darigold's application for a Tier-II Operating Permit. We apply current regulatory dispersion modeling tools to investigate whether the proposed emission limits in this permit application would contribute to or cause a violation of National Ambient Air Quality Standards (NAAQS). The remainder of Appendix C describes the input data and techniques applied by MFG, then presents the results of our modeling analysis.

Dispersion Modeling Techniques

MFG surveyed current regulatory modeling techniques to select the most appropriate model to simulate Darigold's requested emission limits. Darigold's emission sources are located on the plant's roof as depicted in Figure 2. These stacks are potentially influenced by building wake effects from the multi-tiered structures on top of the main building. Although we expected maximum impacts close to the facility due to downwash effects, MFG also wanted to assess potential impacts in the elevated terrain northeast of the plant as shown in Figure 3. For these reasons, we selected the latest version of the EPA regulatory model ISCST3 (Version 98226) for our modeling analysis. ISCST3 is the preferred regulatory dispersion model for complex source configurations, for sources subject to building wake effects, and is one of the models suggested as a screening procedure for sources in complex terrain. The latest version of the model also contains routines to assess the recently revised PM_{10} NAAQS.

Rural conditions. MFG applied ISCST3 using the default options for rural conditions. Although the land use immediately surrounding the facility is light-industrial, the structures are relatively low and not densely packed. Within 3 km, a large potion of the land use is common residential or rural. MFG also estimated the population density surrounding the facility using the U.S. Census Bureau's Land View III software. We found the population density within 3 km of the facility is about 100 persons per square kilometer, less than the EPA criteria for urban conditions of 750 people per square kilometer.

Emission rates. Table 1 and Table 2 list the respective short-term and annual emission rates used by MFG in our modeling analysis. Our model simulations focus on emissions of PM_{10}, nitrogen oxides (NOx), and carbon monoxide (CO).[1] Short-term emission rates for these pollutants are based on recent stack testing results and a margin of safety to assure compliance with the emission limits requested. With the exception of the L-Dryer, the annual emission rates are based on 8760 hours per year.[2] The

[1] The Caldwell Plant also emits small quantities of sulfur dioxide (0.2 TPY) and volatile organic compounds (1.7 TPY). In our opinion, emissions of these pollutants are insignificant and do not warrant a dispersion modeling analysis. We also excluded emissions from the two space heaters exhausted to the main building.

[2] The proposed operating hours for the L-Dryer are 4,380 hours per year or an availability of 50 percent.

rationale for both short and long-term emission rates are discussed in the main body of this document in the section titled *Description of Emission Sources*.

Stack parameters and building configuration. Ground level concentrations are heavily influenced by release characteristics including stack parameters and wakes from nearby structures. MFG used the stack parameters shown in Table 3 in our analysis. The flow rates and temperatures in Table 3 are the average values from recent stack testing. ISCST3 requires wind direction dependent building parameters for each stack potentially influenced by building downwash effects. MFG prepared these data using the EPA Building Profile Input Program (BPIP). BPIP applies EPA guidance to obtain the necessary data from an input file containing building locations, building heights, stack heights, and stack locations. MFG prepared these data using building elevations and a site plan provided by Darigold. Figure 2 shows the relationship used in our model simulations between the stacks and the Caldwell Plant's multi-tiered building. The stacks are all potentially influenced by the elevated portion of the roof labeled as the Anhydro Dryer Building in Figure 2.

PSD receptor network. Figure 4 displays the nested receptor network used by MFG in our model simulations of emissions from the Caldwell Plant. The inner network is a 2 km-by-2 km, 100 m resolution grid approximately centered on the L-Dryer stack. The outer 200 m resolution grid covers a 5 km-by-6 km area and is shifted towards the east so the modeling region incorporates the higher terrain features northeast of the facility. We excluded two receptors located within the building wake, since ISCST3 drops these receptors from the calculations. In order to refine the predictions caused by downwash effects, we also placed a ring of receptors 100 m from the L-Dryer stack. This distance is just outside the building cavity predicted by ISCST3. MFG calculated terrain elevations for the receptors in Figure 3 using the 7.5 minute Caldwell quadrangle obtained from the United States Geological Survey.

Meteorological data. MFG constructed a five year meteorological database using surface and upper air data from Boise Airport. These data were obtained from the EPA SCRAM Internet site for the period 1987 to 1991, the most recent five year period available on the site. We processed the data for ISCST3 using the EPA meteorological pre-processor program PCRAMMET. In order to avoid hours of unrealistically low mixing heights caused by the interpolation algorithms in PCRAMMET, the final input files were screened with a program that ensured all mixing heights were greater than 50 m.

Figure 5 displays a wind rose of the five year meteorological database. Winds at Boise Airport are bimodal, following the general southeast to northwest orientation of the Snake River, bounded by the Boise and Owyhee Mountains. The average wind velocity for the five year period is 3.5 m/s and periods of calm wind occur for 7.9% of the observations. The wind patterns at Boise Airport should be characteristic of conditions at the Caldwell Plant, since Caldwell and the Airport are located near the center of the Snake River valley away from the influence of local drainage winds from either the Owyhee or Boise Mountains.

Background concentrations. In order to confirm compliance with the NAAQS to support Darigold's application, MFG added the contributions from the Caldwell Plant to ambient background concentrations. The background concentrations used are as follows:

- CO - the maximum 1-hour concentration is 23,240 $\mu g/m^3$ (20.3 ppm) and the maximum 8-hour is concentration 9,160 $\mu g/m^3$ (8.0 ppm). These data are the maximum concentrations observed at the Boise monitoring station during 1997

- Nitrogen dioxide (NO_2) - the annual average concentration is 36 $\mu g/m^3$ (0.019 ppm) based on the average concentration observed at the Boise monitoring station during 1997

- PM_{10} - the background concentrations of 37 $\mu g/m^3$ (annual average) and 81 $\mu g/m^3$ (24-hour maximum) were obtained from DEQ staff as representative of the Caldwell area

The background CO and NO_2 concentrations are expected to be very conservative for the Caldwell Plant due to the influence of mobile sources to concentrations observed at the Boise monitoring station.

Dispersion Modeling Results

MFG applied the ISCST3 model to simulate proposed emissions from the Caldwell Plant using five years of meteorological data and other modeling assumptions discussed above. The results of the dispersion modeling are summarized in Table 4 where the maximum concentrations from the Caldwell Plant are compared to the EPA Significant Impact Levels (SILs), and with the addition of background concentrations, to the NAAQS. The results of our modeling for each pollutant are discussed below.

PM_{10} modeling results. The PM_{10} concentration results are listed in Table 4 for the Caldwell Plant. Per the recently revised PM_{10} NAAQS, the 24-hour predictions at each receptor are calculated using the average of the fourth highest concentration for each year of the five year period. Annual concentrations are calculated from the average of the five annual averages. Our modeling shows the maximum contributions when added to ambient background concentrations comply with the PM_{10} NAAQS.

Figure 6 and Figure 7 display contours plots constructed using the model results for the 24-hour and annual averaging periods, respectively. The concentration patterns for each averaging period are aligned with the prevailing winds and the higher concentrations occur very close to the facility. Building downwash effects are responsible for the high local predictions and the concentrations drop off rapidly with distance from the facility. For the annual and 24-hour averaging periods wind persistence tends to be important and the contours align with the prevailing wind directions.

NO_2 modeling results. MFG also predicts Darigold's Caldwell Plant complies with the annual NO_2 NAAQS. As shown in Table 4, the maximum total concentration is lower than the NAAQS even when the conservative background concentration from the Boise urban area is added to the maximum contribution from the Caldwell Plant. Figure 8 presents a contour plot of the maximum annual predictions. Contributions for the Caldwell Plant are based on the highest annual concentration at each receptor during the five year simulations. We also conservatively assume all NOx emitted is converted to NO_2. This is a very conservative assumption given the short distance to the predicted maximum concentration shown in Figure 8.

CO modeling results. The results of our dispersion modeling for CO are summarized in Table 4 and contours plots for the maximum 1-hour and 8-hour concentrations are shown in Figure 9 and Figure 10, respectively. Maximum CO concentrations are less than the EPA SILs and are "insignificant" for regulatory purposes. Although a comparison to the NAAQS is not required for insignificant sources, the CO concentrations are also less than the applicable NAAQS when added to the conservative background values from the Boise monitoring stations. Note, the 1-hour and 8-hour maximum CO concentration patterns tend to be less influenced by wind direction than for the other pollutants whose criteria are based on longer averaging times.

Refined analysis for building wake effects. In our opinion, many of the relatively high predictions for the Caldwell Plant are an artifact of the conservatism embodied in ISCST3's building wake routines. The ISCST3 algorithms incorporate building wake effects by modifying the initial size of the plume, regardless of the wind conditions. This can result in unrealistic, high model predictions in low to moderate wind conditions. During such conditions the mechanical turbulence generated by a structure influencing the stack is much lower and would not affect the diffusion of the source's plume to the extent suggested by the model.

EPA sponsored development of revised building wake routines for ISCST3. The proposed algorithms are included in the "non-guideline" model ISCPRIME. ISCPRIME can be used on a case-by-case basis and has been used for at least one regulatory analysis in Region 10. At some time in the future, Darigold may request a revision to the permit limits for the Caldwell Plant based on more refined modeling with ISCPRIME.

Summary

MFG conducted a dispersion modeling analysis to support a Tier II Operating Permit for Darigold's Caldwell Plant. We assessed proposed PM_{10}, CO and NOx emission limits by comparing conservative predictions from the ISCST3 guideline model to the NAAQS. Our dispersion modeling used a five year meteorological database from Boise Airport, a nested receptor grid with 100 m inner resolution, terrain elevations from the Caldwell quadrangle and modeling assumptions appropriate for rural conditions. Contributions for sources other the Caldwell Plant were accounted for by adding model predictions to background concentrations obtained from DEQ staff and monitoring data from the Boise area.

Our analysis indicates the Caldwell Plant operating with the emission limits proposed in the application complies with the NAAQS. In our opinion the techniques used in our analysis are very conservative and it is likely that actual concentrations near the facility are much lower.

Table 1. Darigold Short-Term Emission Rates			
Stack	Maximum Emission Rates (lb/hr)		
	PM_{10}	NOx	CO
L-Dryer Stack	2.95	0.22	0.18
Anhydro Stack	0.92	0.84	0.71
Niro Dryer Stack	0.96	0.45	0.38
1975 Boiler Stack	0.20	2.70	2.26
1982 Boiler Stack	0.20	2.70	2.26

Table 2. Darigold Long-Term Emission Rates				
Stack	Availability (%)	Annual Emission Rates (TPY)		
		PM_{10}	NOx	CO
L-Dryer Stack	50	6.46	0.48	0.39
Anhydro Stack	100	4.03	3.68	3.11
Niro Dryer Stack	100	4.20	1.97	1.66
1975 Boiler Stack	100	0.88	11.83	9.90
1982 Boiler Stack	100	0.88	11.83	9.90

Table 3. Darigold Stack Parameters				
Stack	Flow Rate (acfm)	Diameter (ft)	Temp. (°F)	Height (ft)
L-Dryer Stack	36950	3.12	167	50
Anhydro Stack	23590	3.30	148	80
Niro Dryer Stack	24350	2.16	165	55
1975 Boiler Stack	4030	2.5	200	50
1982 Boiler Stack	4030	2.5	200	62

Table 4. Comparison of Maximum Predicted Concentrations with National Ambient Quality Standards

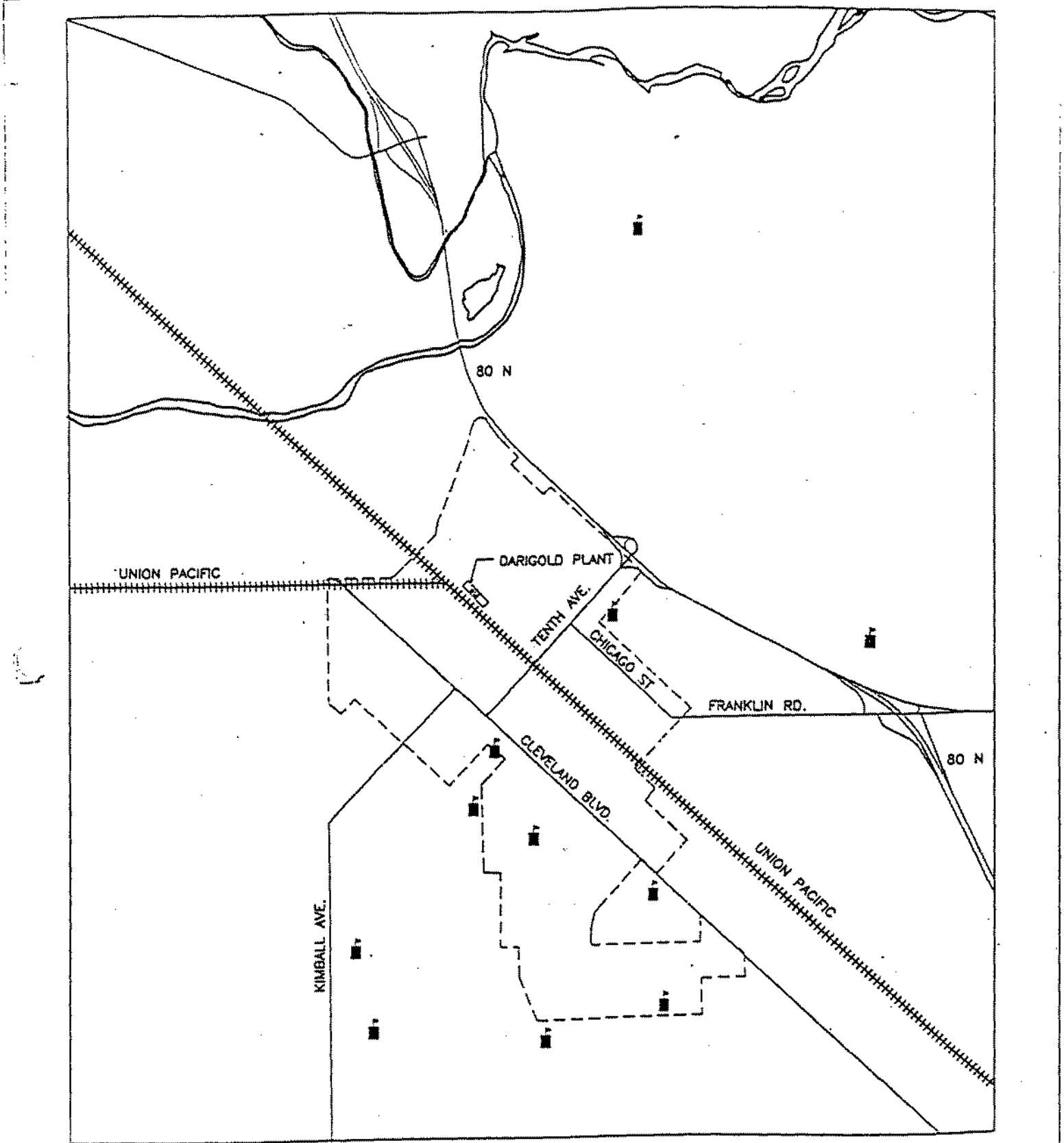
Pollutant	Period	Maximum [b] Darigold Contribution ($\mu g/m^3$)	EPA SIL ($\mu g/m^3$)	Maximum [c] Background ($\mu g/m^3$)	Maximum Darigold Plus Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2(a)	Annual	39	1	36	75	100
CO	8-hour	209	500	9,160	9,660	10000
	1-hour	429	2000	23,240	23,669	40000
PM_{10}	Annual	12.7	1	37	49.7	50
	24-hour	63.6	5	81	144.6	150

(a) All NOx conservatively assumed to be converted to NO_2.

(b) Except PM_{10}, maximum concentration predicted by ISCST3 based on a five year data set. Annual PM_{10} contribution based on five year annual average and 24-hour PM_{10} contribution based on multi-year average of the fourth highest concentration (99^{th} percentile).

(c) Background concentrations are as follows:

CO - maximum one and 8-hour concentrations observed in Boise during 1997
NO_2 - annual average NO_2 concentration observed in Boise during 1997.
PM_{10} - background concentrations obtained from DEQ as representative of the Caldwell area.



LEGEND:

SCHOOL

CITY LIMITS

SCALE

0 1000 m

McCulley, Frick & Gilman, Inc.
ENVIRONMENTAL SCIENCES AND ENGINEERING

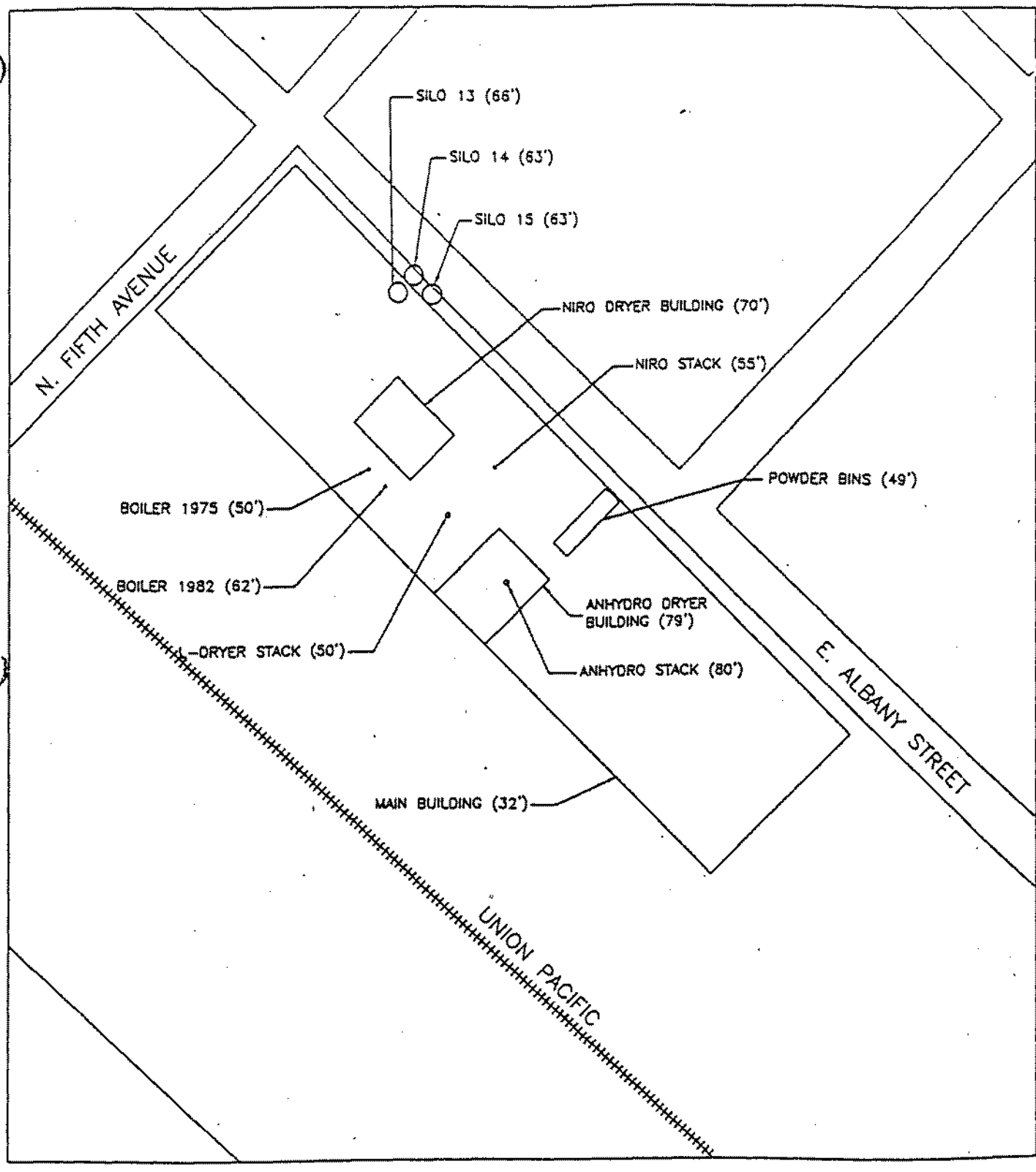
DESIGNED BY: KEN R.
DRAWN BY: KEVIN WARNER
CHECKED BY:
APPROVED BY: KEN R.
FILE NAME: BASE MAP2.DWG

DARIGOLD, INC

BASE MAP
INCLUDING SITE LOCATION

DATE: NOV. 20, 1998

FIGURE 1



N

SCALE

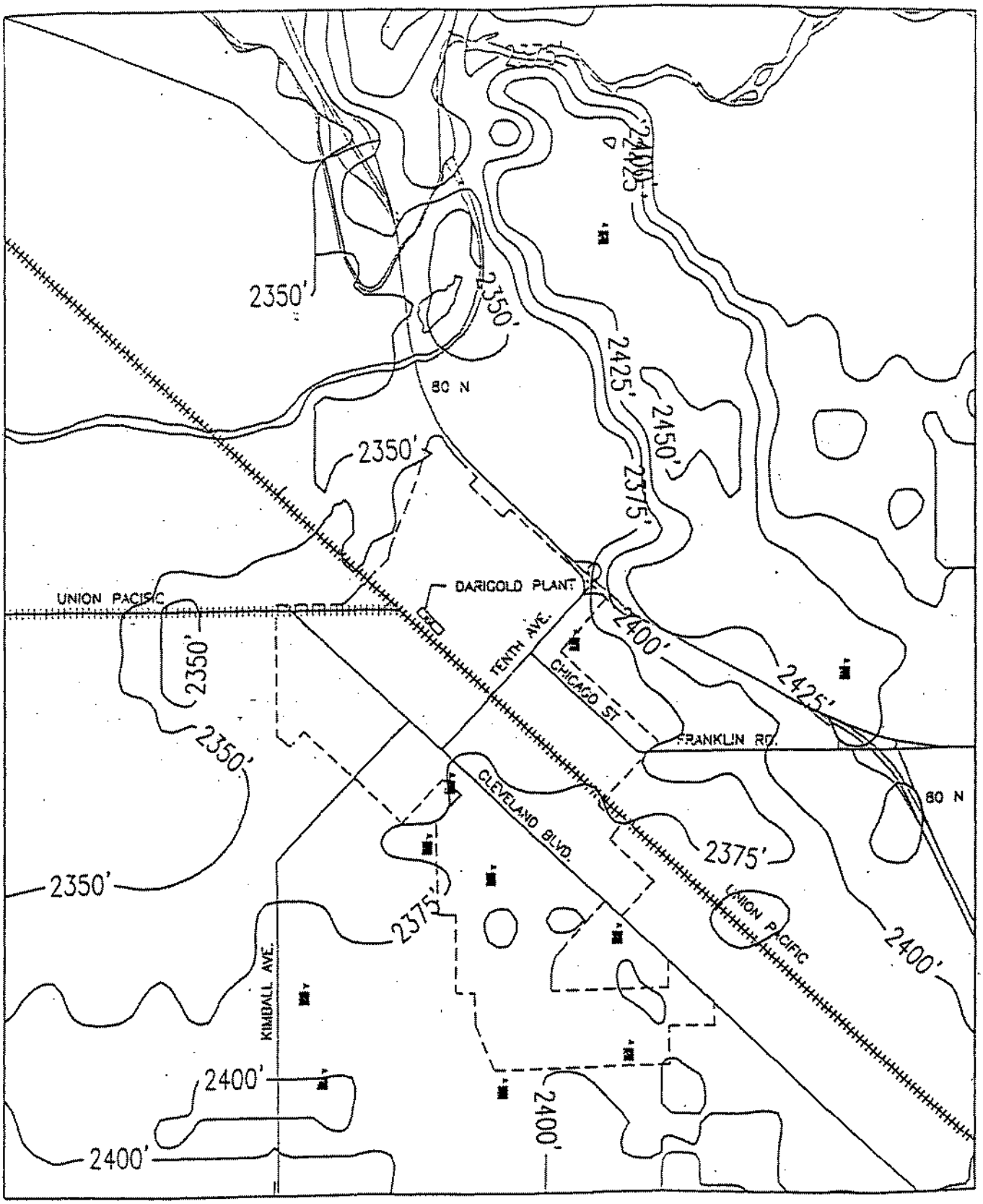
0 50 m

McCulley, Frick & Gilman, Inc.
ENVIRONMENTAL SCIENCES AND ENGINEERING

DESIGNED BY: KEN R.
DRAWN BY: KEVIN WARNER
CHECKED BY:
APPROVED BY: KEN R.
FILE NAME: SITE PLAN.DWG

DARIGOLD, INC

SITE PLAN
SHOWING BUILDING AND STACK HEIGHTS



LEGEND:

- SCHOOL
- CITY LIMITS

N

SCALE

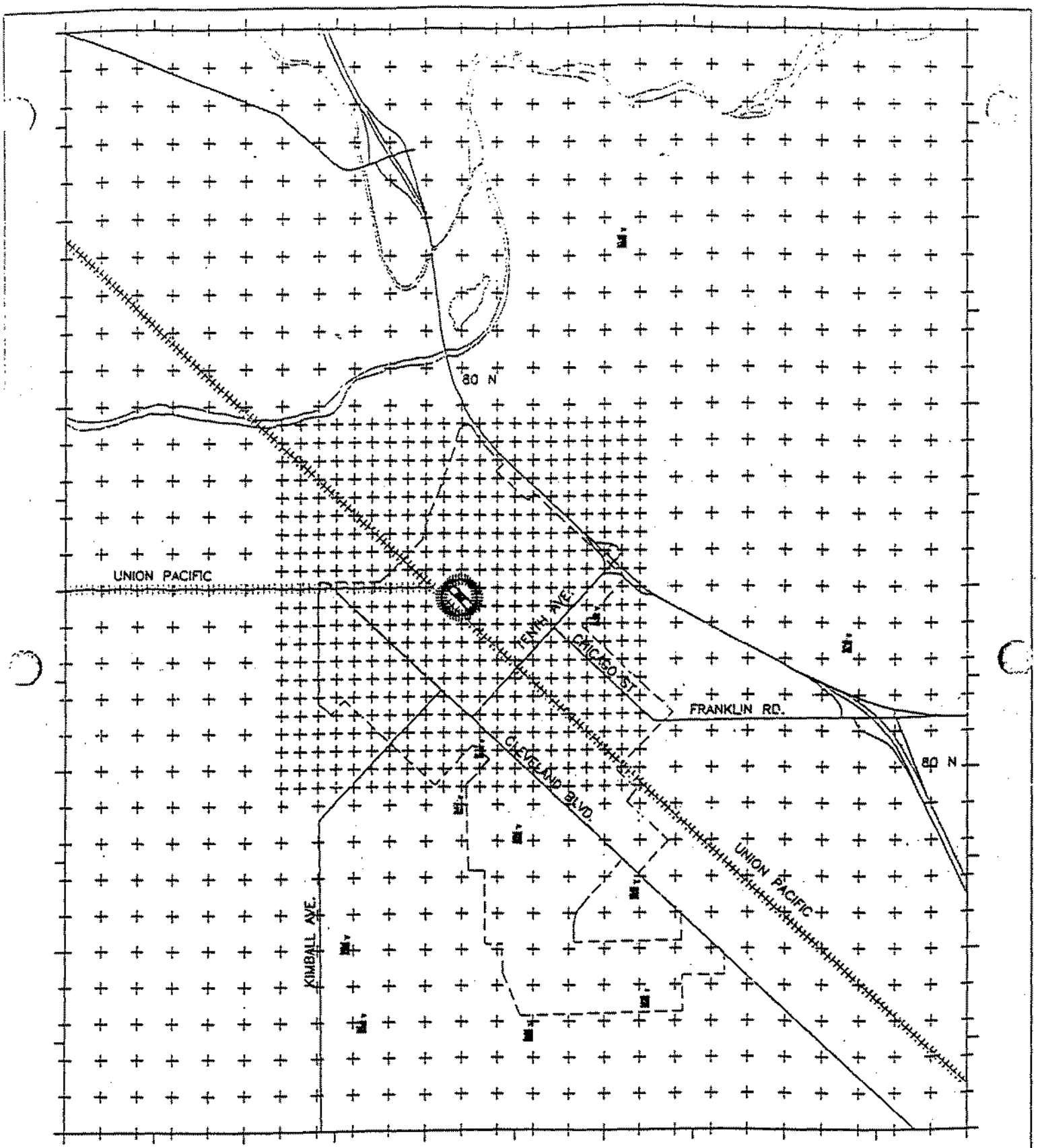
0 1000 m

McCulley, Frick & Gilman, Inc.
ENVIRONMENTAL SCIENCES AND ENGINEERING

DESIGNED BY: KEN R.
DRAWN BY: KEVIN WARNER
CHECKED BY:
APPROVED BY: KEN R.

DARIGOLD, INC

REGIONAL TOPOGRAPHY



LEGEND:

SCHOOL

CITY LIMITS

SCALE

0 1000 m

McCulley, Frick & Gilman, Inc.
ENVIRONMENTAL SCIENCES AND ENGINEERING

DESIGNED BY: KEN R.

DRAWN BY: KEVIN WARNER

CHECKED BY:

APPROVED BY: KEN R.

FILE NAME: RECEPT.DWG

DARIGOLD, INC

RECEPTOR LOCATIONS

DATE: NOV. 22, 1998

FIGURE 4

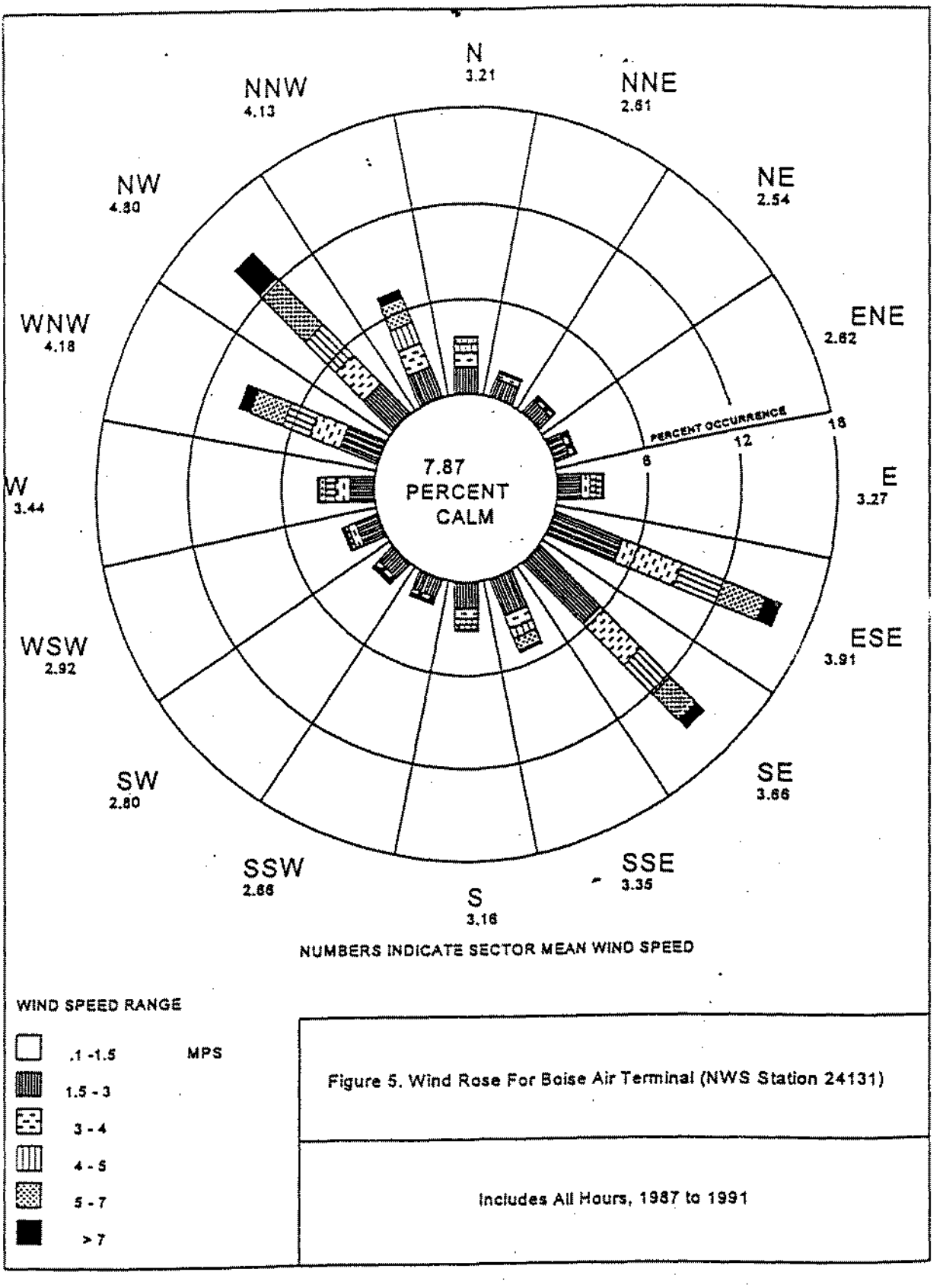
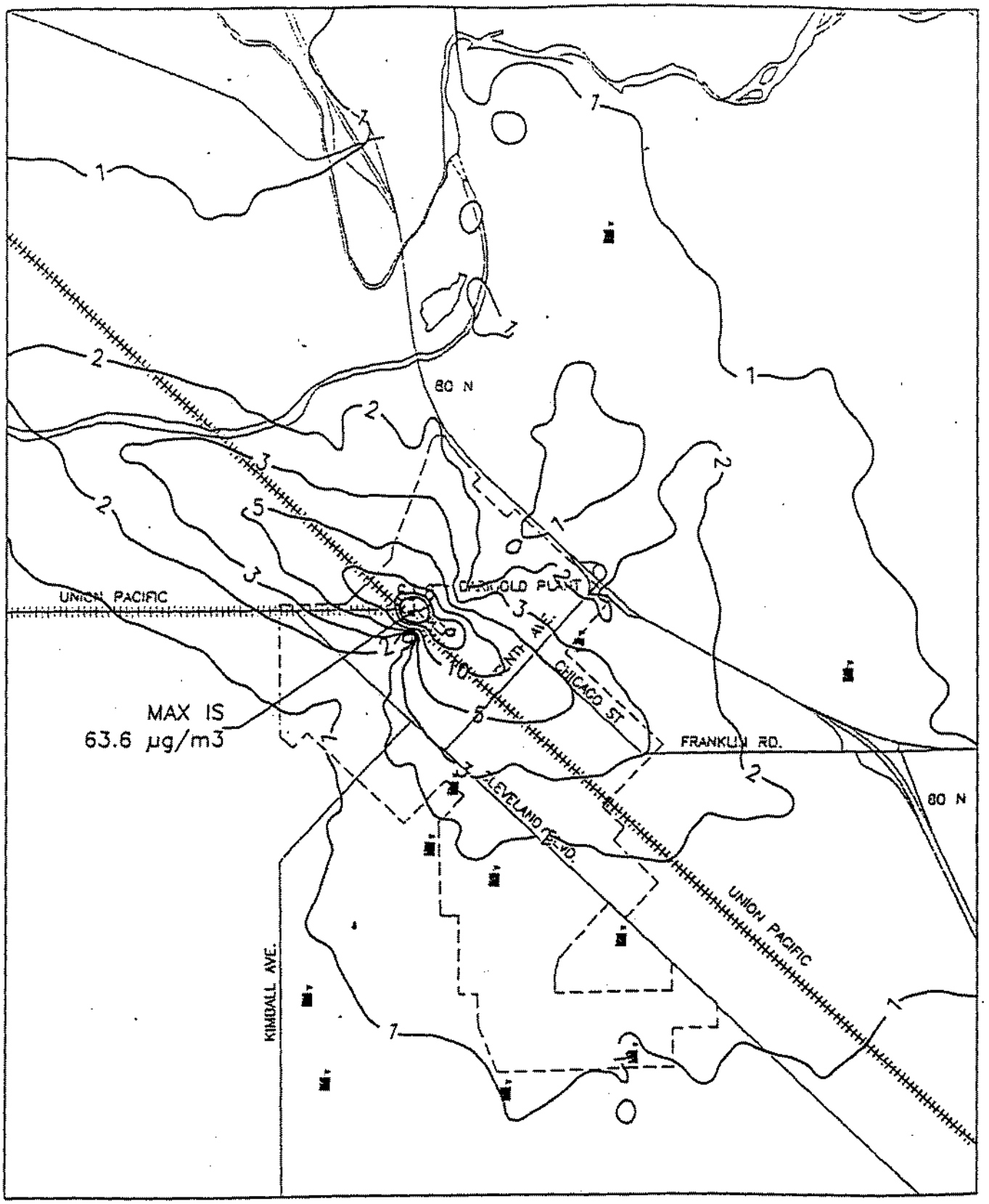


Figure 5. Wind Rose For Boise Air Terminal (NWS Station 24131)

Includes All Hours, 1987 to 1991



LEGEND:

SCHOOL

CITY LIMITS

SCALE

0 1000 m

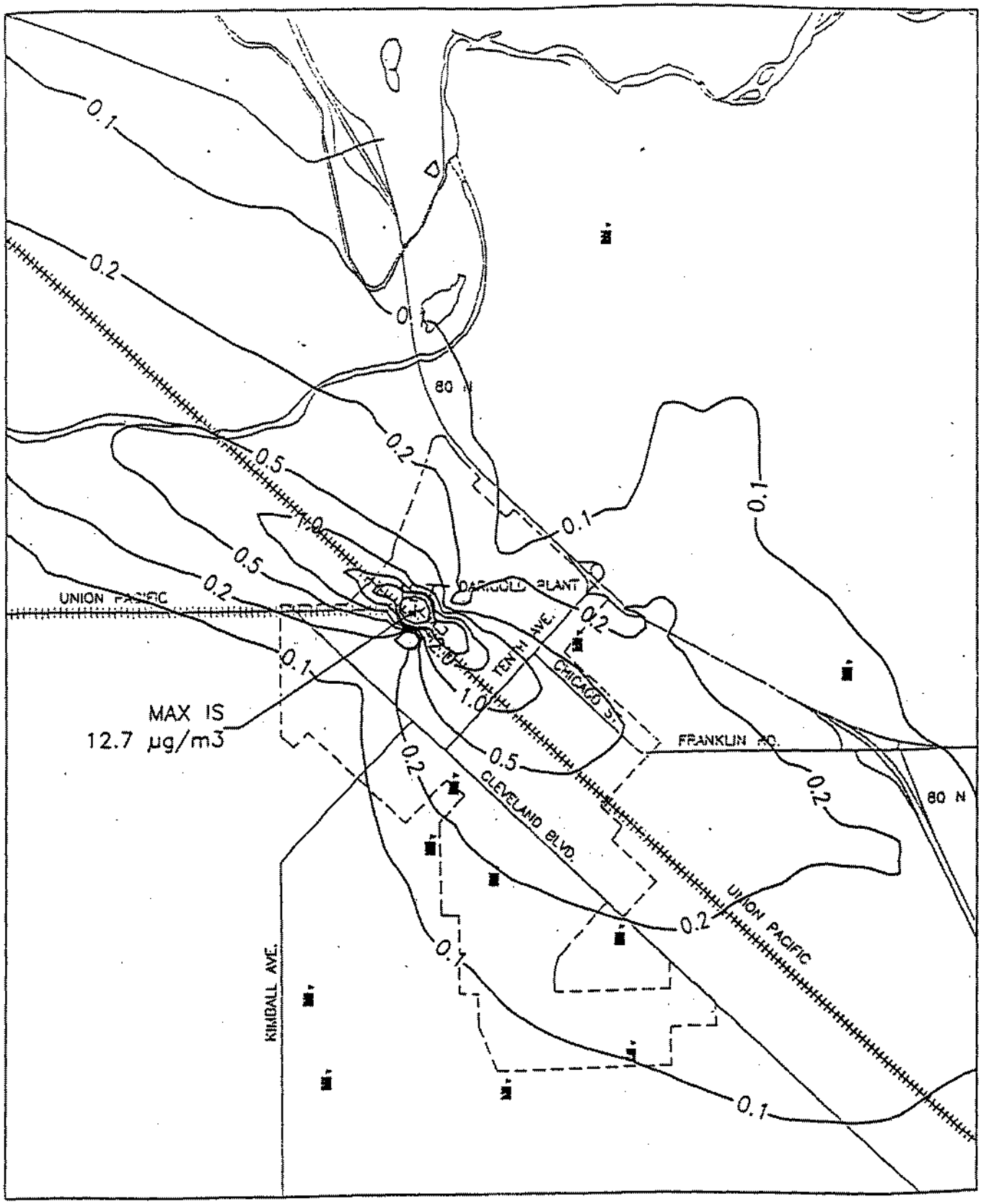
McCulley, Frick & Gilman, Inc.
ENVIRONMENTAL SCIENCES AND ENGINEERING

DESIGNED BY: KEN R.
DRAWN BY: KEVIN WARNER
CHECKED BY:
APPROVED BY: KEN R.
FILE NAME: PM10.DWG

DARIGOLD, INC

AVERAGE FOURTH HIGHEST 24-HOUR PM10 CONCENTRATIONS (µg/m3)

DATE: NOV. 22, 1998 | FIGURE 6



LEGEND:

SCHOOL

CITY LIMITS

SCALE

0 1000 m

McCulley, Frick & Gilman, Inc.
ENVIRONMENTAL SCIENCES AND ENGINEERING

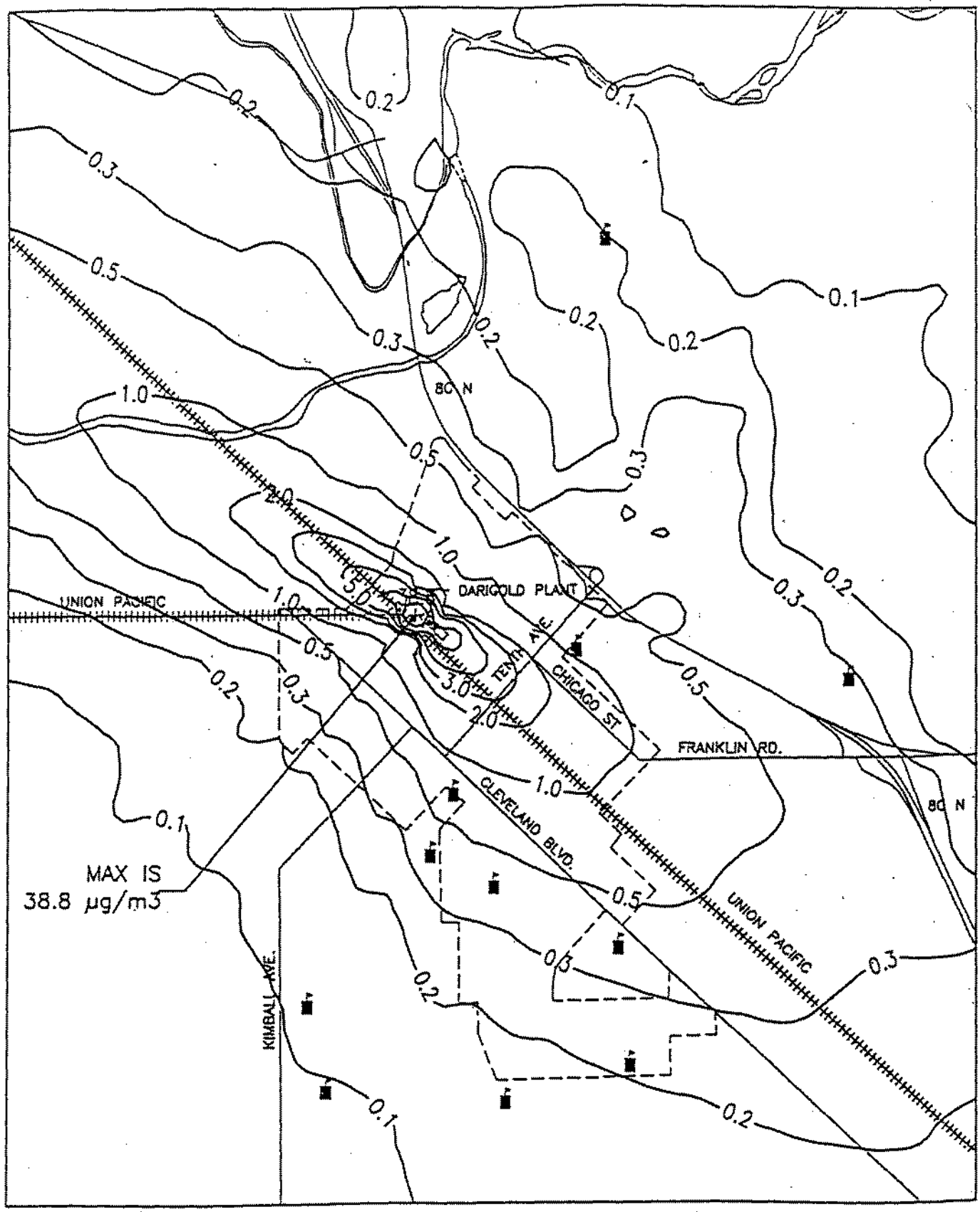
DESIGNED BY: KEN R.
DRAWN BY: KEVIN WARNER
CHECKED BY:
APPROVED BY: KEN R.
FILE NAME: PM10.DWG

DARIGOLD, INC

AVERAGE ANNUAL PM10 CONCENTRATIONS (µg/m3)

DATE: NOV. 22, 1998

FIGURE 7



LEGEND:

SCHOOL

CITY LIMITS

N

SCALE

0 1000 m

McCulley, Frick & Gilman, Inc.
ENVIRONMENTAL SCIENCES AND ENGINEERING

DESIGNED BY: KEN R.

DRAWN BY: KEVIN WARNER

CHECKED BY:

APPROVED BY: KEN R.

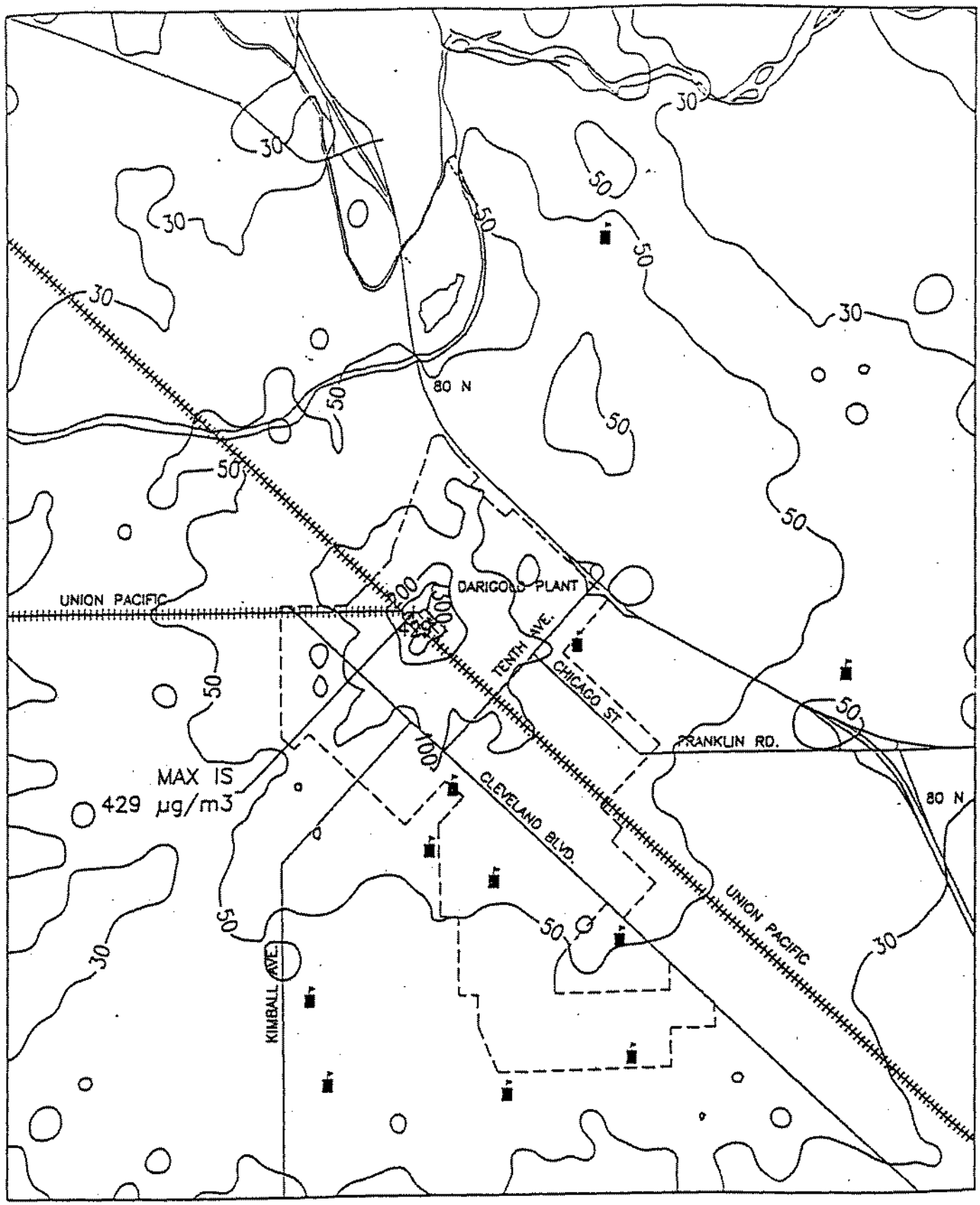
FILE NAME: NOx.DWG

DARIGOLD, INC

MAXIMUM ANNUAL NOx CONCENTRATIONS (µg/m3)

DATE: NOV. 22, 1998

FIGURE 8



LEGEND:

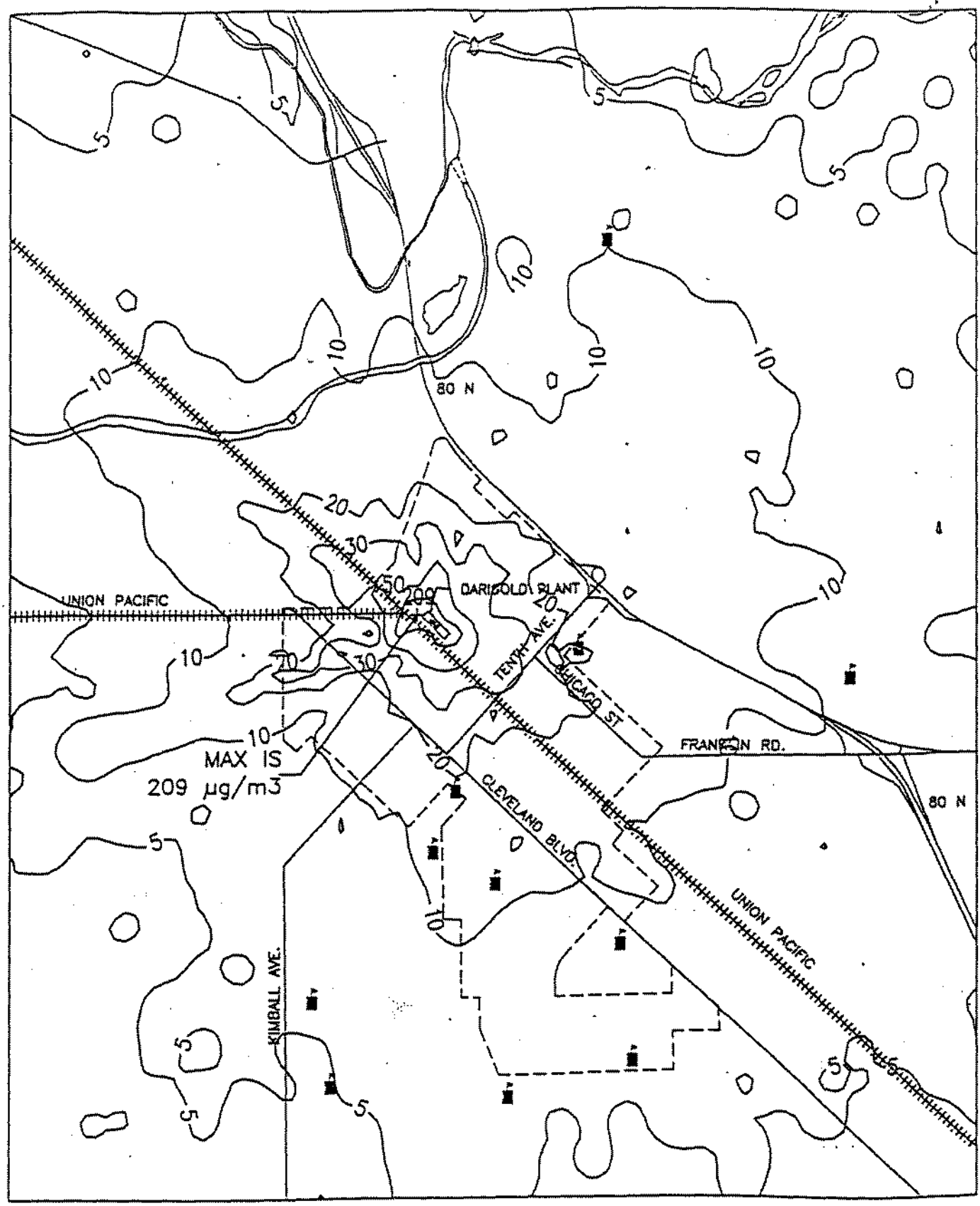
SCHOOL

CITY LIMITS

SCALE

0 1000 m

McCulley, Frick & Gilman, Inc. ENVIRONMENTAL SCIENCES AND ENGINEERING	DARIGOLD, INC
DESIGNED BY: KEN R.	MAXIMUM 1-HR CO CONCENTRATIONS (µg/m3)
DRAWN BY: KEVIN WARNER	
CHECKED BY:	
APPROVED BY: KEN R.	
FILE NAME: 1-HR CO.DWG	DATE: NOV. 22, 1998 FIGURE 9



LEGEND:

SCHOOL

CITY LIMITS

N

SCALE

0 1000 m

McCulley, Frick & Gilman, Inc.
ENVIRONMENTAL SCIENCES AND ENGINEERING

DESIGNED BY: KEN R.

DRAWN BY: KEVIN WARNER

CHECKED BY:

APPROVED BY: KEN R.

FILE NAME: 8HRCO.DWG

DARIGOLD, INC

MAXIMUM 8-HR CO CONCENTRATIONS (µg/m3)

DATE: NOV. 22, 1998

FIGURE 10

APPENDIX C

(AIRS Forms)

GENERAL REPORT INFORMATION:

USER ID: PRY
REPORT NAME: C-DARIGO
FORMAT TYPE: SD
TITLE:

SELECTION CRITERIA:

REGN ME 10
SCSC ME 1602700054

SOURCE DATA INCLUDES:

PLANT LEVEL
POINT LEVEL

WITH ACTIONS
WITH COMMENTS

SORTING ELEMENTS:

JCL PARAMETERS:

ACCOUNT CODE: YIDA
FIMAS ID: AFSCP
TIME (MIN,SEC): 1 59
PRIORITY CODE: 2
MESSAGE CLASS: A
NUMBER OF COPIES: 1
FORM NUMBER:
ROOM/BIN NUMBER: HWET
HOLDING OUTPUT? N
PRINTER SITE ID: N59.U1002
OUTPUT FILES:

STATE PRIVATE AND SENSITIVE AND DRAFT SIP DATA INCLUDED

PLANT: 00054 - DARIGOLD
STATE: ID/16 CITY: - CALDWELL
COUNTY: 027 - CANYON AQCR: 064

GOV'T FACILITY CODE: 0 - ALL OTHER FACILITIES NOT OWNED OR OPER.
AIR-PROGRAM CODE(S): 0 AFS PLANT ID:
OPERATING STATUS : 0 - OPERATING

TOXICITY LEVEL:
STATE REGULATION NUMBER:

VE - VISIBLE EMISSIONS

	STATE	EPA
COMPLIANCE	0 - UNKNOWN COMPLIANCE STATUS	7 - IN VIOLATION - UNKNOWN WI
CLASSIFICATION:		
ATTAIN/NONATTN:	-	-

LOADING: -
RDE14 :
TOXICITY LEVEL:
STATE REGULATION NUMBER:

ACT. NO.	INDIR. NO.	AIR PROGRM	TYPE/DESCRIPTION	DATE SCHEDULD	DATE ACHIEVED	ACT. CAT.	STAFF	RESULTS	PENALTY	RD8	PLLT/CASN RDE 16
001		0	17 ST COMP INSPEC	94/09/30	94/02/02		E34	18 OUT OF COMPLIAN	0		

COMMENT NO.	COMMENT
001	FACILITY HAS NOT PAID REGISTRATION FEES

ACT. NO.	INDIR. NO.	AIR PROGRM	TYPE/DESCRIPTION	DATE SCHEDULD	DATE ACHIEVED	ACT. CAT.	STAFF	RESULTS	PENALTY	RD8	PLLT/CASN RDE 16
002		0	17 ST COMP INSPEC	97/09/30	97/09/04		E34	18 OUT OF COMPLIAN	0		

COMMENT NO.	COMMENT
001	COMPLAINT INVESTIGATION OPACITY VIOL-NIRO DRYER, PTO/PTC VIOL-FAILURE TO PAY REGIS- TRATION FEES

ACT. NO.	INDIR. NO.	AIR PROGRM	TYPE/DESCRIPTION	DATE SCHEDULD	DATE ACHIEVED	ACT. CAT.	STAFF	RESULTS	PENALTY	RD8	PLLT/CASN RDE 16
003		0	SV STATE DAY 0	/ /	97/10/04		01	ACTION ACHIEVED	0		

KEY ACTION(S)	VIOLATING PLLTS	LEAD AGENCY	VIOLATION IDENTIFIER	DAY 90	DAY 150	DAYS TO ADDRESS	UNADDR DAYS
003	PT	-	-	98/01/02	98/03/03	388	0

ACT. NO.	INDIR. NO.	AIR PROGRM	TYPE/DESCRIPTION	DATE SCHEDULD	DATE ACHIEVED	ACT. CAT.	STAFF	RESULTS	PENALTY	RD8	PLLT/CASN RDE 16
004		0	17 ST COMP INSPEC	98/09/30	97/10/21			18 OUT OF COMPLIAN	0	C	

COMMENT NO.	COMMENT
001	COMPLAINT INVESTIGATION OPACITY VIOL-NIRO DRYER, PTC/PTO VIOL, FAILURE TO PAY REGISTRATION FEES

STATE PRIVATE AND SENSITIVE AND DRAFT SIP DATA INCLUDED.

PLANT: 00054 - DARIGOLD
STATE: ID/16 CITY: - CALDWELL
COUNTY: 027 - CANYON AQCR: 064

GOV'T FACILITY CODE: 0 - ALL OTHER FACILITIES NOT OWNED OR OPER.
AIR-PROGRAM CODE(S): 0 AFS PLANT ID:
OPERATING STATUS : 0 - OPERATING

ACT. NO.	INDIR. NO.	AIR PROGRM	TYPE/DESCRIPTION	DATE SCHEDULD	DATE ACHIEVED	ACT. CAT.	STAFF	RESULTS	PENALTY	RD8	PLLT/CASN	RDE 16

COMMENT NO.	COMMENT
001	RESPONSE DUE TO 8/11/98 NOV COMPLIANCE CONF WILL BE HELD 8/26/98
002	CO. RESPONDED 9/11/98-SUMMARY OF ACTIVITIES TO ADDRESS ITEMS IN NOV-CONVERTING ROGERS F DRYER INTO A BAGHOUSE (TO TEST IN OCT), PROTOCOL INCLUDED FOR REVIEW; PTC APPLICATIONS FOR NIRO & ANHYDRO DRYERS; WILL SUBMIT OP APPLIC BY 11/25/98
003	PER 10/2/98 CO. LETTER-CONVERSION OF F DRYER INTO BAGHOUSE FOR NIRO DRYER COMPLETED 9/18/98
004	CO. SUBMITTED SUPPLEMENTAL RESPONSE 11/24/98

009	0		26 VE READING	98/09/02	98/09/02			18 OUT OF COMPLIAN	0			

COMMENT NO.	COMMENT
001	OPACITY VIOL-ANHYDRO WHEY DRYER BAGHOUSE BYPASS STACK

010	0		18 SOURCE TST CON	98/10/05	/ /				0			

COMMENT NO.	COMMENT
001	TESTING OF ANHYDRO, NIRO, RODGERS "L" WHEY DRYERS. TESTING SCHEDULED FOR WEEK OF 10/5/98. PER 10/2/98 DEQ LETTER-PROTOCOL APPROVED.

011	0		L5 EPA NOV	/ /	98/10/27			08 ISSUED	0			

COMMENT NO.	COMMENT
001	NOV ISSUED - EPA DOCKET # 10-98-0127-CAA IN VIOLATION OF THE IDAHO STATE IMPLEMENTATION PLAN APPROVED BY EPA PURSUANT TO SECTION 110 OF THE ACT 42 U.S.C. SECTION 7410.

STATE PRIVATE AND SENSITIVE AND DRAFT SIP DATA INCLUDED

PLANT: 00054 - DARIGOLD
STATE: ID/16 CITY: - CALDWELL
COUNTY: 027 - CANYON AQCR: 064
GOV'T FACILITY CODE: 0 - ALL OTHER FACILITIES NOT OWNED OR OPER.
AIR-PROGRAM CODE(S): 0 AFS PLANT ID:
OPERATING STATUS : 0 - OPERATING

POINT INFORMATION: / 010 M - NAT GAS FIRED BOILERS (2)

STATE SENSITIVE INDICATOR:
DESIGN CAPACITY: 0 UNITS: -
CONTINUOUS EMISSIONS (Y/N): N
REGULATED SOURCE CLASS CODE: 10200602
OPERATING RESTRICTIONS:

---------STATE---------- --------EPA----------
LAST INSPECT. : / / TYPE: : / / TYPE:
SOOT BLOWING :
TIMES PER DAY : 0 TIMES PER WEEK: 0 AM OR PM:

COMMENT NO.	COMMENT
001 C	DARIGOLD OPERATES TWO 25.1 MMBTU/HR NAT GAS FIRED BOILERS (1 INSTALLED IN EARLY 1970 & THE OTHER INSTALLED IN 1986). ONE BOILER IS IN CONTINUOUS OPERATION WHILE THE OTHER IS ON STANDBY OR UNDERGOING MAINTENANCE
002 C	CONTROLS: OXYGEN CONTROLLERS

AIR PROGRAM: 0 - SIP 0 - OPERATING ---------STATE---------- --------EPA----------
POLLUTANT-CODE: PT COMPLIANCE STATUS: 3 - IN COMPLIANCE - INSPECTIO : -
STATE-IMPLEMENTATION-PLAN: - RDE7: RDE15:

POINT INFORMATION: / 020 M - BOX SPRAY DRYERS

STATE SENSITIVE INDICATOR:
DESIGN CAPACITY: 0 UNITS: -
CONTINUOUS EMISSIONS (Y/N): N
REGULATED SOURCE CLASS CODE: 30203001
OPERATING RESTRICTIONS:

---------STATE---------- --------EPA----------
LAST INSPECT. : / / TYPE: : / / TYPE:
SOOT BLOWING :
TIMES PER DAY : 0 TIMES PER WEEK: 0 AM OR PM:

COMMENT NO.	COMMENT
001 C	2 BOX SPRAY WHEY DRYERS, F & L CONTROLS: NONE

STATE PRIVATE AND SENSITIVE AND DRAFT SIP DATA INCLUDED

PLANT: 00054 - DARIGOLD
STATE: ID/16 CITY: - CALDWELL
COUNTY: 027 - CANYON AQCR: 064

GOV'T FACILITY CODE: 0 - ALL OTHER FACILITIES NOT OWNED OR OPER.
AIR-PROGRAM CODE(S): 0 AFS PLANT ID:
OPERATING STATUS : 0 - OPERATING

POINT INFORMATION: / 030 M - SPRAY DRYERS

ACT. NO.	PLANT	AIR PROGRM	TYPE/DESCRIPTION	DATE SCHEDULD	DATE ACHIEVED	ACT. CAT.	STAFF	RESULTS	PENALTY	RD8	PLLT/CASN	RDE 16
003		0	26 VE READING	98/09/02	98/09/02			18 OUT OF COMPLIAN	0			

COMMENT NO.	COMMENT
001	NIRO SPRAY DRYER OPACITY - 28.75%

COMMENT NO.	COMMENT
001	ANHYDRO DRYER BAGHOUSE OPACITY - 33.86%

POINT INFORMATION: / 040 M - MILK POWDER BAGGING

STATE SENSITIVE INDICATOR:
DESIGN CAPACITY: 0 UNITS: -
CONTINUOUS EMISSIONS (Y/N): N
REGULATED SOURCE CLASS CODE: 30203099
OPERATING RESTRICTIONS:

---------STATE---------- --------EPA----------
LAST INSPECT. : / / TYPE: : / / TYPE:
SOOT BLOWING :
TIMES PER DAY : 0 TIMES PER WEEK: 0 AM OR PM:

COMMENT NO.	COMMENT
001 C	BAGGING OPERATION CONSISTS OF 4 LARGE POWDER STORAGE BINS, 1 SKIM MILK POWDER & 3 WHEY POWDER; 2 WEIGH HOPPERS; & 2 BAGGING STATIONS (1 EACH FOR SKIM & WHEY)
002 C	CONTROLS: BIN VENT FILTER

AIR PROGRAM: 0 - SIP 0 - OPERATING ---------STATE---------- --------EPA----------